

## Homework 1 Solutions — Problem 3

### Part a)

I went out one night while I was in Hyde Park and making a rough estimate I believe I saw some number in hundreds of star on a clear night.

### Part b)

We can get an estimate of the number of atoms in the Sun by assuming that it is only made out of Hydrogen atoms. Knowing that the mass of a Hydrogen atom is  $m_h = 1.67 \times 10^{-24}$  grams and that the total mass of the Sun is  $M_{Sun} = 1.989 \times 10^{33}$  grams, we can calculate as follows the number of atoms in the Sun

$$M_{Sun} = N_H \times m_H,$$
$$\frac{M_{Sun}}{m_H} = N_H$$

where  $N_H$  is the number of Hydrogen atom. From performing this calculation we obtain  $N_H = 1.2 \times 10^{57}$  atoms.

### Part c)

Assuming that the life of an average person is 70 years and knowing there are 365 days in a year and 24 hours in a day and 60 minutes in an hour and 60 seconds oin a minute, we get

$$70 \text{ years} \times \frac{365 \text{ days}}{1 \text{ year}} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ minutes}}{1 \text{ hour}} \times \frac{60 \text{ seconds}}{1 \text{ minute}}.$$

Now years in the numerator cancels years in the denominator, days in the numerator cancels days in the denominator, etc., and the answer is

$$70 \times 365 \times 24 \times 60 \times 60 \text{ seconds} = 2 \times 10^9 \text{ seconds}.$$

Two billion seconds. Enjoy every single one!